Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

August 31, 2017

10 CFR 50.73

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 1
Facility Operating License No. NPF-90
NRC Docket No. 50-390

Subject: **Licensee Event Report 390/2017-004-01, Manual Reactor Trips Due to Failed Reactor Coolant Pump Power Transfer During Plant Startup**

This submittal provides Licensee Event Report (LER) 390/2017-004-01. This LER supplement provides details concerning two manual reactor trips that occurred when a Reactor Coolant Pump failed to properly transfer from its alternate to normal power supply. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A).

There are no regulatory commitments contained in this letter. Please direct any questions concerning this matter to Kim Hulvey, WBN Licensing Manager, at (423) 365-7720.

Respectfully,

Paul Simmons
Site Vice President
Watts Bar Nuclear Plant

Enclosure
cc: See Page 2

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Watts Bar Nuclear Plant

NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Watts Bar Nuclear Plant, Unit 1	05000390	1 OF 5

4. TITLE

Manual Reactor Trips Due to Failed Reactor Coolant Pump Power Transfer During Plant Startup

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
05	02	2017	2017	- 004	- 01	08	31	2017	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
26	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Dean Baker, Licensing Engineer	423-452-4589

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
A	EA	RLY	WES	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On May 2, 2017, at 1945 Eastern Daylight Time (EDT) and on May 4, 2017 at 1710 EDT, Watts Bar Nuclear (WBN) Plant Unit 1 reactor was manually tripped due to a failure of the Reactor Coolant Pump (RCP) Board 1C normal feeder breaker to close during the planned power transfer to unit power following plant startup. Concurrent with each reactor trip, the Auxiliary Feedwater system actuated as designed. All control and shutdown rods fully inserted. All safety systems responded as designed for both events.

For the first event, the cause was incorrectly attributed to a high resistance contact resulting in the normal feeder breaker failing to close. In the investigation following the second event, a relay associated with the RCP Board 1C control circuit was found incorrectly configured due to a human performance issue, which resulted in a standing trip signal on the RCP normal feeder breaker. To prevent recurrence, procedures will be revised to address material control of pretested components.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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		YEAR	SEQUENTIAL NUMBER	REV NO.
Watts Bar Nuclear Plant, Unit 1	05000390	2017	- 004	- 01

NARRATIVE

I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

Watts Bar Nuclear Plant (WBN) Unit 1 was at approximately 26 percent rated thermal power (RTP) for the first trip and at approximately 28 percent for the second trip.

II. DESCRIPTION OF EVENT

A. Event Summary

On May 2, 2017, at 1945 Eastern Daylight Time (EDT) and on May 4, 2017 at 1710 EDT, Watts Bar Nuclear (WBN) Plant Unit 1 reactor was manually tripped due to a failure of the Reactor Coolant Pump (RCP) {EIIS:P} Board 1C normal feeder breaker {EIIS:BKR} to close during the planned power transfer to unit power {EIIS:EA} during plant startup following a refueling outage. Concurrent with the manual reactor trip, the Auxiliary Feedwater (AFW) {EIIS:BA} system actuated as designed. All control and shutdown rods fully inserted. All safety systems responded as designed for both events.

These events are being reported to the Nuclear Regulatory Commission (NRC) under 10 CFR 50.73(a)(2)(iv)(A) for initiation of a manual reactor trip and automatic actuation of the AFW system.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

Control relay WBN-1-RLY-245-0152-Z2, associated with the RCP Board 1C power transfer logic, was configured incorrectly.

C. Dates and Approximate Times of Occurrences

Date	Time (EDT)	Event
4/06/2017		Work Order (WO) 117754323 steps performed to set-up replacement relay WBN-1-RLY-245-0152-Z2. Work steps include verification of contact configuration and an energized test. Craft took relay to Fix-It Now (FIN) shop upon completion of bench test.
4/08/2017		Craft gave relay to foreman for storage.
4/13/2017		WO 117543323 work resumed, relay is installed in the Main Relay board. An independent verification of wire lifts and lands for the replacement relay is performed.
5/02/2017	1945	Unit 1 is manually tripped when RCP 1C failed to transfer to its normal source. Enter 1-E-0, Reactor Trip or Safety Injection.
5/02/2017	1948	Transition to 1-ES-0.1, Reactor Trip Response.
5/02/2017	2012	Transition to 1-GO-5, Unit Shutdown from 30 percent Reactor Power to Hot Standby.
5/03/2017		Troubleshooting incorrectly concludes that high resistance on a breaker limit switch is the cause of the breaker for the RCP Board 1C normal feeder failing to close.

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Date	Time (EDT)	Event
5/04/2017	1710	Unit 1 is manually tripped when the RCP Board 1C failed to transfer to its normal source. Enter 1-E-0.
5/04/2017	1716	Transition to 1-ES-0.1, Reactor Trip Response.
5/04/2017	1743	Transition to 1-GO-5, Unit Shutdown from 30 Percent Reactor Power to Hot Standby.
5/07/2017		Troubleshooting concludes that failure to transfer is associated with misconfigured relay contacts.
5/09/2017	0355	RCP Board 1C successfully transferred from alternate to normal power during plant startup.

D. Manufacturer and Model Number of Components that Failed During the Event

The relay that failed was an MG-6 multi-contact Auxiliary Relay with six configurable contacts, Part number 289B359A21, manufactured by Westinghouse Electric Corporation.

E. Other Systems or Secondary Functions Affected

All safety systems and secondary functions operated as designed.

F. Method of discovery of each Component or System Failure or Procedural Error

Inspection of relay WBN-1-RLY-245-0152-Z2 found that the contacts were not properly configured.

G. Failure Mode and Effect of Each Failed Component

With the relay misconfigured, RCP 1C could not be loaded onto the plant unit board.

H. Operator Actions

For both events, when RCP Board 1C failed to transfer to its normal operating power source, plant operators manually tripped the reactor. An automatic trip is not expected for the plant conditions and the manual reactor trip was briefed prior to the commencement of the transfer evolution. Plant operators promptly stabilized the plant and transitioned from the emergency operating procedures to the normal shutdown procedure.

I. Automatically and Manually Initiated Safety System Responses

The plant operators initiated a manual reactor trip when RCP 1C failed to transfer to its operating power source. AFW automatically actuated and all automatic systems operated as designed.

III. CAUSE OF THE EVENT

A. The cause of each component or system failure or personnel error, if known.

After the first event, the cause was incorrectly attributed to a high resistance contact resulting in

NARRATIVE

the normal feeder breaker failing to close. In the investigation following the second event, a relay associated with the RCP Board 1C control circuit was found incorrectly configured as a result of a loss of material control that occurred following bench testing but prior to installation.

1-RLY-245-152-Z2 had been replaced during the Unit 1 refueling outage. The replacement relay was installed with a misconfigured contact pair which provided a standing trip signal on the RCP Board Normal Feeder Breaker. This event was the result of material controls not being clearly defined and enforced by maintenance personnel to ensure the integrity of pre-tested materials is maintained between testing and installation.

B. The cause(s) and circumstances for each human performance related root cause.

Following initial setup and testing of the relay during the refueling outage, the relay was staged in the FIN shop from April 6 to April 8, 2017. This inappropriate storage resulted in a loss of material control.

IV. ANALYSIS OF THE EVENT

During a normal start up at WBN, after the main generator has been synchronized to the grid, the power source for the RCPs is transferred from the Common Station Service Transformers (CSSTs, offsite power) to the Unit Station Service Transformers (USSTs) which are powered by the main generator. With relay WBN-1-RLY-245-0152-Z2 misconfigured, the RCP normal feeder breaker to the USSTs would not close. Prior to performing this power transfer, operations personnel had briefed on actions to perform in the event the power transfer failed, which included manually tripping the reactor. Operations personnel were able to promptly stabilize the plant following these trips.

V. ASSESSMENT OF SAFETY CONSEQUENCES

These events are bounded by a partial loss of forced reactor coolant flow, which is an anticipated operational occurrence described in the Final Safety Analysis Report (FSAR).

A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event

All safety systems operated as designed during this event.

B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident

Not applicable.

C. For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from the discovery of the failure until the train was returned to service

All safety systems operated as designed during this event.

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VI. CORRECTIVE ACTIONS

These events were entered into the Tennessee Valley Authority (TVA) Corrective Action Program and are being tracked under Condition Reports (CRs) 1291140 and 1292231.

A. Immediate Corrective Actions

Following the second event, the misconfigured relay was replaced and properly tested.

B. Corrective Actions to Prevent Recurrence or to Reduce Probability of Similar Events Occurring in the Future

Procedures related to control of materials will be revised to ensure requirements are established to appropriately label materials to identify pretesting has been satisfactorily completed.

VII. PREVIOUS SIMILAR EVENTS AT THE SAME SITE

A manual reactor trip was reported to the NRC in LER 391/2017-002 dated May 12, 2017. This event was attributed to craft personnel inadvertently tripping a secondary pump, which led to a secondary plant transient requiring operations personnel to manually trip the plant when steam generator levels could not be adequately maintained. While the event described in this LER also involves human performance, the prior event involved contractor control.

VIII. ADDITIONAL INFORMATION

None.

IX. COMMITMENTS

None.